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Agricultural Memorandum No 597

Chances of soil moisture deficits suitable for subsoiling at end of August

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For subsoiling to be carried out satisfactorily, a S.M.D. of at least 50 mm is needed at the end of August.

Using the methods and stations listed in MAFF Tech. Bull.No 24, 30 years of records were examined and observed frequencies found of

(a) SMD greater than 2 in
(b) SMD greater than 4 in

The full data is given in the Appendix for all regions.

The following formulae hold for average annual rainfalls (R) up to about 50 inches.

Regression Formulae and Correlations.

Region	Greater than 50 mm	Greater than 100 mm
Cumberland and Northumberland	15.05 - 0.35R (-0.93)	5.1 - 0.14R (-0.92)
Northern (except Cumb. N'land)	13.95 - 0.27R (-0.90)	9.4 - 0.24R (-0.84)
Midlands	16.7 - 0.34R (-0.78)	12.9 - 0.35R (-0.80)
East	13.5 - 0.2R (-0.45)	15.9 - 0.44R (-0.60)
Southeast	13.0 - 0.16R (-0.66)	15.0 - 0.35R (-0.82)
Southwest	17.1 - 0.29R (-0.78)	10.0 - 0.19R (-0.73)
Wales	17.35 - 0.31R (-0.90)	6.6 - 0.13R (-0.74)

R = average annual rainfall in inches.

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From these equations, the following tables can be drawn up:-

(a) Chances (years in 10) of a greater deficit than 50 mm on August 31st.

Region	Average Annual Rainfall						
	20	25	30	35	40	45	50
Cumberland) Northumberland)		6.3	4.5	2.8	1.1	<1	<1
North (except above)	8.5	7.2	5.8	4.5	3.2	1.9	<1
Midlands	>9	8.2	6.5	4.8	3.1	1.4	<1
East	>9	8.5	7.5				
Southeast	>9	9.0	8.2	7.4	6.6		
Southwest		>9	8.4	7.0	5.5	4.1	2.6
Wales		>9	8.0	6.5	5.0	3.4	2.0

(b) Chances (years in 10) of a greater deficit than 100 mm on August 31st.

Region	Average Annual Rainfall						
	20	25	30	35	40	45	50
Cumberland) Northumberland)		1.6	<1	<1	<1	<1	<1
North (except above)	4.6	3.4	2.2	1.0	<1	<1	<1
Midlands	5.9	4.2	2.4	1.0	<1	<1	<1
East	7.1	4.9	2.7				
Southeast	8.0	6.2	4.5	2.8	1.0		
Southwest		5.3	4.3	3.4	2.4	1.5	<1
Wales		3.4	2.7	2.1	1.4	<1	<1

Any comments or suggestions on this paper should be referred to the author.

January 1974

Meteorological Office
Bracknell

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Appendix

Northern England

Years in 10 when a given deficit was experienced at the end of August

		Av. Ann. Rainfall	Under 1	Under 2	Under 2.5	Over 2.5	Over 3	Over 4 inches
xx	Ambleside	74	9.0	9.7	10.0	0.0	0.0	0.0
xx	Bolton	56	8.0	8.7	9.0	1.0	1.0	0.0
	Morecambe	38	5.3	6.7	7.0	3.0	2.3	0.3
	Ilkley	38	4.3	6.0	7.3	2.7	2.3	1.0
	Blackpool	35	1.7	4.0	4.7	5.3	4.3	1.3
	Newton Rigg	35	4.0	6.0	7.0	3.0	1.3	0.7
x	Bellingham	35	5.3	8.0	8.7	1.3	1.0	0.3
	Manchester	34	4.0	5.3	7.0	3.0	2.0	1.0
x	Carlisle	32	5.3	6.0	7.7	2.3	1.3	0.7
	Ampleforth	30	3.0	5.0	5.7	4.3	3.0	1.7
x	Cockle Park	29	2.3	4.3	6.7	3.3	2.0	1.0
	Houghall	28	2.7	4.3	5.3	4.7	3.7	2.0
	Wakefield	26	2.0	2.7	4.3	5.7	5.0	2.7
	Driffield	26	1.3	2.7	3.7	6.3	5.0	1.3
	Askham Bryan	26	1.3	2.0	3.0	7.0	5.0	3.3
x	Tynemouth	26	2.0	4.0	5.3	4.7	3.0	2.0
	Hull	25	1.7	3.3	4.3	5.7	4.7	4.0
x	Berwick	23	2.7	3.7	5.0	5.0	3.3	1.7
	Finningley	22	0.7	2.0	2.3	7.7	7.0	5.7

x Stations in Cumberland and Northumberland

xx Stations omitted from regressions

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Midland England

Years in 10 when a given deficit was experienced at the end of August

	Av. Ann. Rainfall	Under 1	Under 2	Under 2.5	Over 2.5	Over 3	Over 4 inches
Hanley	33	3.0	5.3	6.3	3.7	3.7	1.3
Delamere	33	2.3	5.7	7.3	2.7	2.3	1.0
Birmingham	31	2.3	3.3	4.3	5.7	4.3	2.3
Gt. Missenden	30	1.3	2.7	3.3	6.7	5.3	4.0
Walsall	29	2.3	3.3	4.0	6.0	4.3	2.7
Ch. Norton	29	1.3	2.7	4.0	6.0	4.7	3.7
Belper	29	2.0	4.3	5.0	5.0	4.0	2.3
Ross	28	0.0	0.7	1.0	9.0	7.7	3.3
Mansfield	27	1.7	2.0	2.3	7.7	6.0	4.0
Cheltenham	27	0.7	2.3	4.0	6.0	6.0	3.3
Towcester	27	1.7	2.3	3.7	6.3	5.3	3.3
Leicester	26	2.3	2.7	4.0	6.0	4.3	2.0
Oxford	26	0.7	1.0	3.3	6.7	5.7	3.0
Shrewsbury	26	1.0	2.3	2.7	7.3	7.3	4.0
Worcester	25	0.3	1.3	2.3	7.7	6.0	4.0
Leamington Spa	25	0.7	2.3	2.7	7.3	7.0	4.7
Kettering	24	1.0	1.3	2.0	8.0	7.3	5.7
Newp. Pagnell	24	0.0	1.7	2.7	7.3	6.7	5.7
Ketton	24	0.3	2.3	3.0	7.0	7.0	4.7
Cranwell	23	1.0	1.3	1.7	8.3	8.0	5.0
Sutton Bon.	23	1.3	2.0	3.0	7.0	6.3	4.0

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Eastern England

Years in 10 when a given deficit was experienced at the end of August

	Av. Ann Rainfall	Under 1	Under 2	Under 2.5	Over 2.5	Over 3	Over 4 inches
Swaffham	25	0.7	1.0	2.0	8.0	7.0	5.0
Sprowston	25	0.3	1.7	1.7	8.3	7.3	5.7
Spalding	24	1.3	1.3	2.0	8.0	7.7	5.0
Lowestoft	24	0.0	0.7	1.3	8.7	7.3	5.0
Cleethorpes	23	0.3	1.0	2.0	8.0	7.7	3.3
Saff. Walden	23	0.7	1.0	1.3	8.7	8.0	6.0
March	23	0.7	1.3	2.0	8.0	6.7	5.0
Sandy	23	0.3	1.7	3.3	6.7	6.7	4.3
Kings Lynn	23	0.3	1.0	1.7	8.3	8.0	6.0
Cambridge	22	1.3	1.7	2.3	7.7	7.7	5.7
Hatfield Pev.	22	0.3	0.3	0.3	9.7	9.3	7.0
Mildenhall	22	0.3	1.0	1.7	8.3	8.0	6.0
St Ives	22	0.7	2.0	2.3	7.7	7.3	5.3
Felixstowe	21	0.0	0.0	0.0	10.0	9.3	7.7

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Southeast England

Years in 10 when a given deficit was experienced at end of August

	Av. Ann Rainfall	Under 1	Under 2	Under 2.5	Over 2.5	Over 3	Over 4 inches
Bodiam	32	0.3	1.7	2.3	7.7	6.3	4.3
Wye	30	0.7	2.3	2.3	7.7	7.0	5.7
Chichester	30	1.0	2.0	2.3	7.7	7.0	5.0
Wantage	29	0.0	2.3	3.3	6.7	6.3	3.3
Rothamsted	28	0.7	2.3	3.0	7.0	5.7	5.0
Portsmouth	28	0.0	0.7	2.0	8.0	7.7	5.7
Wealdstone	27	0.3	1.0	2.0	8.0	7.7	5.7
Croydon	27	0.0	0.7	1.3	8.7	8.3	5.7
S. Farnborough	27	0.0	1.7	2.7	7.3	7.3	5.3
E. Malling	27	0.0	0.7	1.0	9.0	7.7	5.3
Reading	26	0.3	2.0	3.0	7.0	6.7	5.0
Kew	24	0.3	1.0	1.7	8.3	7.7	6.7
Swanley	23	0.0	0.7	1.0	9.0	8.3	6.7
Margate	21	0.0	0.3	0.3	9.7	9.0	8.7

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Southwestern England

Years in 10 when a given deficit was experienced at end of August

	Av. Ann Rainfall	Under 1	Under 2	Under 2.5	Over 2.5	Over 3	Over 4 inches
St. Austell	48	4.3	6.3	7.7	2.3	1.7	1.3
Plymouth	38	2.3	4.3	5.3	4.7	3.3	1.7
Hartland Pt.	36	2.3	4.3	5.3	4.7	4.3	2.0
Newquay	34	1.0	3.0	3.3	6.7	6.3	3.3
Blandford	34	0.0	0.7	1.0	9.0	7.7	4.7
Marlborough	34	0.3	3.3	4.3	5.7	5.3	3.7
Lizard	33	0.7	2.0	3.0	7.0	6.0	2.7
Bristol	32	2.0	4.3	5.0	5.0	3.0	1.3
Exeter	32	0.0	0.3	1.0	9.0	7.7	5.7
Leckford	32	1.3	3.3	4.0	6.0	5.3	3.3
Bournemouth	31	0.7	1.0	1.7	8.3	7.3	5.0
Cannington	30	0.7	1.7	3.0	7.0	5.7	3.7
Martock	29	0.3	1.0	1.7	8.3	8.3	4.7
Boscombe Down	28	0.3	0.7	1.7	8.3	6.3	4.3

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Wales

Years in 10 when a given deficit was experienced at end of August

	Av.Ann. Rainfall	Under 1	Under 2	Under 2.5	Over 2.5	Over 3	Over 4 inches
Carmarthen	52	8.0	8.3	8.7	1.3	1.0	0.3
Brecon	45	4.3	5.7	6.7	3.3	2.3	1.0
Aberdovey	45	7.3	8.0	8.7	1.3	1.0	0.0
Cardiff	42	5.0	6.7	7.0	3.0	2.3	0.3
New Radnor	42	6.0	6.7	7.3	2.7	1.7	0.7
Pembroke	42	2.3	4.0	5.7	4.3	2.7	1.0
Cardigan	41	3.0	5.3	6.0	4.0	2.0	1.0
Derwen	41	3.3	6.0	7.3	2.7	2.0	0.3
Abergavenny	39	2.3	4.0	5.7	4.3	4.3	3.0
Amlwch	38	3.3	4.7	5.7	4.3	2.3	1.3
Wrexham	35	1.3	2.7	3.0	7.0	4.3	1.7
Welshpool	35	3.0	4.7	5.7	4.3	2.7	1.3
Denbigh	33	1.7	2.3	3.0	7.0	6.3	3.0
Hanmer	30	0.7	2.7	4.7	5.3	4.7	1.7
Llandudno	29	0.7	1.0	2.0	8.0	6.7	3.7